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ABSTRACT

This guide, which was written as an initial step in the development of a systemwide articulated curriculum sequence for all vocational programs within the Metropolitan Nashville Public School System, outlines the suggested scope and sequence of a 3-year program in computer programming. The guide consists of a course description; general course objectives; course content outlines for each of the three years of the computer programming sequence; and lists of recommended textbooks, curriculum guides, and audiovisual materials. Included in the course content outline for the first-year course are specific objectives and lesson topics addressing the following skills: orientation to computers, computer theory, data entry, computer-related careers, software, and programming skills. The outlines for the remaining two components of the course cover programming in Beginner's All-Purpose Instruction Code (BASIC), FORTRAN, COBOL, and RPG. (MN)

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VOE COMPUTER PROGRAMMING

SCOPE AND SEQUENCE

VOCATIONAL EDUCATION

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Metropolitan Public Schools

Nashville Davidson County, Tennessee

Charles O. Frazier, Director

FOREWORD

This scope and sequence guide, developed for the VOE Computer Programming Vocational Education program, represents an initial step in the development of a systemwide articulated curriculum sequence for all vocational programs within the Metropolitan Nashville Public School System. It is a direct result of needs expressed by teachers, parents, and the business community for sequential structure within the vocational education curriculum. An articulated vocational curriculum allows a student to move from one level of instruction to the next without repeating learning tasks already mastered, and without experiencing gaps in the presentation of relevant instructional material.

A goal of this curriculum effort is to provide teachers a usable guide based on input from the teachers. The initial step was an identification of course content, with all teachers having an opportunity to contribute. What follows is a publication using the teachers' contributions: a sequential listing of objectives and skills for each program offering.

This guide does not include all specific resource materials that may be used to assist students in acquiring minimum competencies. It is to serve as a guide for the sequence of course content and scope of what is to be taught. This guide content is extremely important and its use is encouraged. The suggested competencies and resource materials allow instructors an opportunity to be creative and resourceful in meeting the needs of individual programs and students.

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The Committee:

Instructors	Schools
Linda Argo	Glencliff
Sandra Black	Madison
Nancy Hobbs	Whites Creek
Brent Hurst	Hillsboro
Pat Maxwell	Pearl/Cohn
William Osborne	Stratford
W. E. (Bill) Reid	Hillwood
Andrea Sukow	Hillsboro

Committee Coordinator: Preliminary Committee-Linda Gallaher-McGavock, Minnie Saunders-McGavock and Jeanne Sowards-McGavock
Revision Committee-Patricia Brock-Overton

Program Area: Kenneth B. Anderson

Editorial Consultant/Design/Layout

Judy Beier - Commerical Art Instructor - Maplewood
Mary Jo Grady - Commercial Art Instructor - Pearl/Cohn
Joy Binkley - Editing
Dr. Jim Lorenz - Third Party Evaluator
Exemplary Project Staff
Vocational Program Coordinators

Printing/Binding/Typesetting/Technical Assistance

Sam White - Printing Instructor - Overton
Jesse Ray - Printing Instructor - Whites Creek
Cleve Yokely - Printing Instructor - Stratford
Kenneth Ford - Manager - Metropolitan Public School Binding
Robert Tucker - Director - Metropolitan Public School Printing Department
Jean Porter - Publications Specialist - Department of Communication and Community Relations
Debbie Fulghum - Typesetter - Department of Communication and Community Relations

INTRODUCTION

This guide was developed and revised by computer instructors in June, 1984. Computer Programming is offered to students in the Metropolitan Public School System in grades 10, 11 and 12.

Computer Programming is designed to provide academic training in the areas of data processing concepts, computer programming, computer operations and systems concepts. Students who successfully complete this program should be qualified for entry level jobs such as data entry operator, computer operator, and junior programmer. This program also provides students with a strong foundation for more advanced study in the computer field.

It is highly recommended that students successfully complete Algebra I and possess keyboarding skills prior to enrolling in Computer Programming I. A student must have completed Computer Programming I in order to enroll in the advanced courses.

COURSE DESCRIPTION

General course descriptions vary from school to school due to the variety of equipment in each school. Students will learn to write, test and debug programs in at least one major computer programming language. Students will be introduced to data processing concepts and will actually have "hands-on" experience with the computer system.

Computer Programming I is an introduction to the history and principles of data processing and their relationship to business and industry. Students will be introduced to computer systems and additional peripheral equipment. Students will develop skills and knowledge to flowchart, program computers and test and debug programs within the limits of available equipment. Students will learn to write programs in at least one language.

Computer Programming II and III are a continuation of Computer Programming I.

GENERAL COURSE OBJECTIVES

1. To train qualified students for entry level positions in the data processing field in business and industry
2. To provide students with academic training in the areas of data processing concepts, computer programming, computer operations, systems concepts and communication/supervisory functions
3. To prepare students for interaction with fellow workers and supervisors
4. To enable students to communicate effectively
5. To train students for skill development in the operation, control and management of computer systems, equipment and other data processing devices
6. To provide a curriculum of maximum flexibility for the various types of school programs
7. To teach students to become ethical business persons

COURSE CONTENT FOR VOE COMPUTER PROGRAMMING I

(First and Second Semesters)

I. Orientation to computers (5 days)

Specific objective:

To learn the effects of computers in society
To learn about the history of computers
To learn about the people who influenced the early development of computers

A. Computers in society

1. Understands effects on daily life

2. Understands effects on business

a. Entertainment

b. Science and engineering

c. Sports

d. Transportation

e. Humanities

B. History

1. Learns early history

a. Abacus

b. Pascal

c. Babbage

d. Hollerith

e. Powers

f. Watson

I. **Orientation to computers continued:**

C. Early computers

1. Becomes aware of Mark I
2. Becomes aware of ENIAC
3. Becomes aware of EDVAC
4. Becomes aware of UNIVAC

D. Generations of computers

II. **Theory (4 weeks)**

Specific objectives:

To learn the data processing framework
To learn how data is represented by data processing math
To learn about the wide variety of computer hardware
To construct flowcharts

A. Fundamentals of data processing

1. Learns input
2. Learns processing
3. Learns output

B. Data processing math

1. Learns decimal number system
2. Learns binary number system
3. Learns octal number system
4. Learns hexadecimal number system
5. Learns data codes

C. Flowcharts

1. Learns symbols
2. Learns logic

C. Flowcharts continued:

3. Learns to use template

D. Computer hardware

1. Becomes aware of types

a. Analog

b. Digital

2. Becomes aware of sizes

a. Micro

b. Mid

c. Large-scale

3. Identifies input devices

a. Magnetic tapes

b. Cards

c. Disks

d. Keyboard

4. Identifies output devices

a. Printer

b. Tapes

c. Display

d. Disk

5. Identifies storage devices

a. Auxiliary

b. External

c. Core

D. Computer hardware continued:

6. Learns data communications

a. Batch processing

b. On-line realtime processing

c. Time sharing processing

III. Data entry (1 week)

Specific objectives:

To learn about data entry devices
To develop minimum skills for data entry

A. Keypunch

1. Identifies 80-column

2. Identifies 96-column

3. Recognizes fields

4. Learns Hollerith

B. Verifier

C. Cathode ray tube (CRT)

D. Magnetic ink character readers (MICR)

E. Optical scanners (OCR)

IV. Careers (1 week)

Specific objective:

To learn the qulifications, duties and salaries of careers in data processing

A. Titles

1. Learns function of data entry operator

2. Learns function of computer operator

3. Learns function of computer programmer

A. Titles continued:

4. Learns function of systems analyst

5. Learns function of other related careers

B. Descriptions

C. Requirements

D. Salaries

V. **Software (1 week)**

Specific objectives:

To learn about the computer software available
To learn the different applications of high-level languages

A. Low-level languages

1. Becomes familiar with machine language

2. Becomes familiar with assemblers

3. Becomes familiar with interpreters

4. Becomes familiar with compilers

B. Job control languages (system commands)

C. High-level languages

1. Becomes familiar with FORTRAN - math oriented

2. Becomes familiar with BASIC - microcomputer oriented

3. Becomes familiar with RPG - business oriented

4. Becomes familiar with COBOL - business oriented

5. Becomes familiar with PASCAL - structured language

VI. **Programming (28 weeks)**

Specific objectives:

Specific objectives continued:

To write logical step-by-step instructions to instruct the computer in at least one programming language
To document programs by testing, debugging and reporting
To operate computer equipment

A. BASIC

B. FORTRAN

C. RPG

D. COBOL

E. PASCAL

COURSE CONTENT FOR VOE COMPUTER PROGRAMMING II

(Advanced BASIC and/or FORTRAN)

(First and Second Semesters)

I. Introduction to Microcomputers (1 week)

Specific objectives:

To learn about BASIC and microcomputers in our society
To become familiar with the techniques for interactive programming on a microcomputer
To acquire a working knowledge of the BASIC language
To solve problems
To prepare a flowchart showing the logic needed to solve a problem
To develop computer operations skills

A. History of BASIC

B. Parts of the microcomputer system

C. Safety

D. Operation and maintenance

E. Careers

II. Theory (3 weeks)

Specific objectives:

To develop an understanding of the program development and coding process
To develop and understanding and recognition of good programming techniques

A. System commands

B. Review of logic

1. Reviews algorithms

2. Reviews flowcharting

B. Review of logic continued:

3. Reviews programming

III. **Programming features (32 weeks)**

Specific objectives:

To develop the ability to design a good program by decomposing the program into a series of functional modules
To develop the ability to use string functions with most language interpreters
To create a disk output file
To read the data in a disk file into main computer storage for processing
To acquire a knowledge of the statements necessary to process disk files

A. Types of instructions

1. Learns system commands

2. Learns BASIC statements

3. Learns monitor commands

B. Documentation

C. Program structure

D. Variable names

1. Learns numeric variables

2. Learns string variables

E. Assignment statements

F. Calculations

G. Counters and accumulators

H. Loops and nested loops

I. Comparisons

J. Output manipulation

K. Shortcuts

III. **Programming features continued:**

L. Editing

M. Disk operation

N. Disk BASIC

O. Error messages

P. Subroutines

Q. Advanced math operators

R. Advanced system commands

S. Relational operators

T. Logical operators

U. Arrays

V. Advanced string manipulation

W. Advanced output manipulation

X. Graphics

1. Learns video

2. Learns printer

Y. Advanced graphics

Z. Disk file maintenance

AA. Disk data files

COURSE CONTENT FOR VOE COMPUTER PROGRAMMING II

(COBOL)

(First and Second Semesters)

(This course is based on COBOL. If not applicable, BASIC or another language could substitute.)

I. Introduction (1 week)

Specific objectives:

To operate the available equipment
To logically flowchart before writing programs
To acquire a working knowledge of COBOL
To write programs in COBOL, test and debug the program independently
To be an ethical business person

A. Equipment

1. Becomes familiar with various parts
2. Learns basic elementary maintenance procedures
3. Learns importance of safety
4. Learns operation procedures

B. History of COBOL

C. Careers in programming

1. Becomes aware of requirements
2. Becomes aware of duties
3. Becomes aware of salary

II. Theory (2 weeks)

Specific objectives:

To develop an understanding of the program development and coding process

Specific objectives continued:

To develop an understanding and recognition of good programming techniques

A. Flowcharting introduction

1. Develops program logic
2. Learns to use symbols
3. Learns to use template
4. Practices application

B. Job control language (JCL)

C. Documentation

1. Practices testing
2. Practices debugging
3. Practices reporting

III. Programming features (33 weeks)

Specific objectives:

To develop the ability to design a good program by decomposing the program into a series of functional modules
To develop the ability to use string functions with most language interpreters
To create a disk output file
To read the data in a disk file into main computers storage for processing
To acquire a knowledge of the statements necessary to process disk files

A. Basic input, calculation and output

B. Codes, editing and system data

C. Grand totals

D. Headings

E. Compare statements

F. Control codes and indicators

III. **Programming features continued:**

G. Control breaks and multiple control breaks

H. Card counters

I. Group indication and group printing

J. Fetching

K. Looping

L. Subroutines

M. Multiple record types/stacker control

N. Look ahead

O. Exception output

P. Arrays

Q. Crossfooting

R. Table look-up

S. Array look-up

T. Disk file maintenance

COURSE CONTENT FOR VOE COMPUTER PROGRAMMING II

(RPG)

(First and Second Semesters)

(This course content is based on RPG. If not applicable, BASIC or another language could substitute.)

I. Introduction (1 week)

To operate the available equipment
To logically flowchart before writing programs
To acquire a working knowledge of RPG
To write programs in RPG, test and debug the program independently
To be an ethical business person

A. Equipment

1. Becomes familiar with various parts
2. Learns basic elementary maintenance procedures
3. Learns importance of safety
4. Learns operation procedures

B. History of RPG

C. Careers in programming

1. Becomes aware of requirements
2. Becomes aware of duties
3. Becomes aware of salaries

II. Theory (2 weeks)

Specific objectives:

To develop an understanding of the program development and coding process
To develop an understanding and recognition of good programming techniques

II. **Theory continued:**

A. Flowcharting introduction (review)

1. Develops program logic
2. Learns to use symbols
3. Learns to use template
4. Practices application

B. Job control language (JCL)

C. Documentation

1. Practices testing
2. Practices debugging
3. Practices reporting

III. **Programming features (33 weeks)**

Specific objectives:

To develop the ability to design a good program by decomposing the program into a series of functional modules
To develop the ability to use string functions with most language interpreters
To create a disk output file
To read the data in a disk file into main computers storage for processing
To acquire a knowledge of the statements necessary to process disk files

A. Basic input, calculations, output

B. Grand totals

C. Headings

D. Compare statements

E. Working storage

F. Condition names with GO TO option

G. Page control

III. **Programming features continued:**

H. Line counter

I. Heading subroutines

J. Minor, intermediate and major totals

K. Control codes

L. Control codes with minor, intermediate and major totals

M. Sort verb

N. Table look-up

O. Set/search table look-up

P. Disk file maintenance

RESOURCE MATERIALS

Text books

Couger, J Daniel and McFadden, Fred R. A First Course in Data Processing. New York: John Wiley and Sons, Inc., 1977.

Dwyer. A Guided Tour of BASIC. Houghton-Mifflin Company.

Keys, William J. Introduction to Computer Programming Basic FORTRAN IV, A Practical Approach. Fullerton, California: Anaheim Publishing Company, 1981.

Lien, David A. Learning Level II. San Diego, California: Compusoft Publishing, 1979.

Marateck, Samuel L. BASIC. New York: Academic Press, 1975.

Radio Shack. Part 2: BASIC Programming. Fort Worth: Radio Shack, 1979. 26-2151

Radio Shack. Part 1 and 2: Introduction to BASIC, TRS-80. Fort Worth: Tandy Corporation, 1980. 26-2151

Radio Shack. TRS 80's and Disk BASIC. Forth Worth: Radio Shack, 1979.

Shelly, Gary B. and Cashman, Thomas J. Introduction to Computers and Data Processing. Fullerton, California: Anaheim Publishing Company, 1980.

Shelly, Gary B. and Cashman, Thomas J. Introduction to Computer Programming ANSI COBOL. Fullerton, California: Anaheim Publishing Company, 1977.

Shelly, Gary B. and Cashman, Thomas J. Introduction to Computer Programming RPG II. Fullerton, California: Anaheim Publishing Company, 1977.

Shelly, Gary B. and Cashman, Thomas J. Introduction to Computer Programming Structured COBOL. Fullerton, California: Anaheim Publishing Company, 1982.

Shelly, Gary B. and Cashman, Thomas J. Introduction to Flowcharting and Computer Programming Logic. Fullerton, California: Anaheim Publishing Company, 1978.

Shelly, Gary B. and Cashman, Thomas J. Introduction to BASIC Programming. Fullerton, California: Anaheim Publishing Company, 1982.

RESOURCE MATERIALS

Textbooks continued:

Shelly, Gary B. and Cashman, Thomas J. Introduction to Computer Programming RPG. Fullerton, California: Anaheim Publishing Company, 1977.

Stewart, George. Getting Started with TRS-80 BASIC. Houston: Tandy Corporation, 1980.

Curriculum Guides

Articulated Curriculum Guide. Memphis: State of Tennessee, Department of Education, Division of Vocational-Technical Education, 1979.

Audio Visual

Filmstrips

"How Computers Work", Encyclopedia Britannica Educational Corporation, 1972.

"Your Working Future: Computer Careers", Encyclopedia Britannica Corporation, 1973.

"Computer Programming", Educational Activities, Inc., 1978.